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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6: G09G 5/00, H04H 1/00	A1	(11) International Publication Number: WO 96/02049
		(43) International Publication Date: 25 January 1996 (25.01.96)

(21) International Application Number: PCT/US95/08345

(22) International Filing Date: 3 July 1995 (03.07.95)

(30) Priority Data:
08/272,681 8 July 1994 (08.07.94) US

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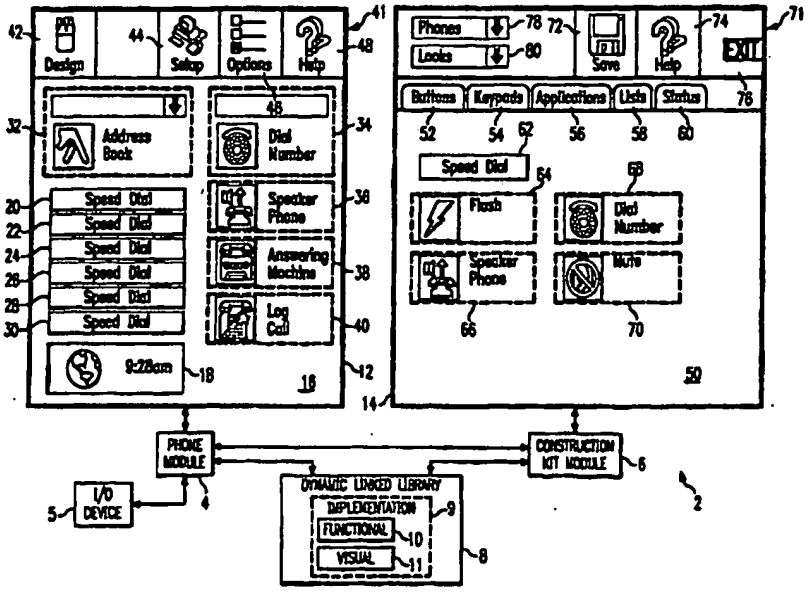
(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.

(54) Title: COMPUTER ON-SCREEN TELEPHONE HAVING A TELEPHONE CONSTRUCTION KIT AND METHOD OF OPERATION



(57) Abstract

A computer on-screen telephone (2) is provided that includes a plurality of implementations (9) each defining a telephone feature control. The computer on-screen telephone (2) also includes a phone module (4) coupled to the plurality of implementations (9). The phone module (4) is operable to create and maintain a phone window (12) displaying a first plurality of telephone feature controls. The phone module (4) also is operable to invoke an implementation (9) defining a selected telephone feature control responsive to user input in the phone window (12).

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COMPUTER ON-SCREEN TELEPHONE HAVING A TELEPHONE CONSTRUCTION KIT AND METHOD OF OPERATION

TECHNICAL FIELD OF THE INVENTION

This invention relates in general to the field of electronic systems, and more particularly to a computer on-screen telephone having a telephone construction kit and method of operation.

BACKGROUND OF THE INVENTION

Personal computers are widely used for both business and personal applications. Personal computers often are utilized to run programs that function to replace conventional devices such as telephones, answering machines, calendars and address books. With respect to telephones, a number of conventional computer programs implement a telephone interface allowing a user of the program to place and receive telephone calls, receive messages, record messages and perform other such telephone function.

Conventional telephone programs constitute object code executed by a personal computer. One problem with these conventional telephone programs is that they are inflexible. Every user has individual likes and dislikes about the features and appearance of a telephone. However, conventional telephone programs provide only one appearance and set of features that must be used by every user. Any change to the appearance, layout or operation of the computer on-screen telephone must be accomplished by changing the source code and recompiling the program. It is desirable that a telephone program provide a user with the ability to alter the appearance, layout and features implemented to meet the user's individual needs and preferences.

Some conventional computer programs provide a user with limited drag and drop utilities. None of these drag and drop utilities allow a user interactively to change the appearance, layout and operation of a computer program. One conventional implementation of drag and drop utilities is in file management programs where a user can rearrange icons representing programs or files in a window. Another conventional implementation is in programming tools for creating source code for computer programs. Some of these tools allow a programmer to drag

and drop icons representing predefined blocks of code. Upon compilation, the blocks of code associated with the dropped icons are included and compiled in the object code. However, it is desirable that a user of a computer program be able interactively to change the appearance and features of the computer program without being forced to recompile source code.

SUMMARY OF THE INVENTION

Therefore, a need has arisen for a computer on-screen telephone having a telephone construction kit allowing a user interactively to customize the appearance, layout and features of the computer on-screen telephone without requiring recompilation of source code.

In accordance with the present invention, a computer on-screen telephone having a telephone construction kit and method of operation are provided that substantially eliminate or reduce disadvantages and problems associated with prior computer on-screen telephone programs.

According to one embodiment of the present invention, a computer on-screen telephone is provided that includes a plurality of implementations each defining a telephone feature control. The computer on-screen telephone also includes a phone module coupled to the plurality of implementations. The phone module is operable to create and maintain a phone window displaying a first plurality of telephone feature controls. The phone module also is operable to invoke an implementation defining a selected telephone feature control responsive to user input in the phone window when the computer on-screen telephone is in a telephone state. The computer on-screen telephone further includes a construction kit module coupled to the phone module and to the plurality of implementations. The construction kit module is operable to create and maintain a construction kit window displaying a second plurality of telephone feature controls. The construction kit module also is operable to control customization of the phone window responsive to user input when the computer on-screen telephone is in a design state.

According to another embodiment of the present invention, a construction kit for a computer on-screen telephone is provided that includes a plurality of

implementations each defining a telephone feature control. The construction kit also includes a construction kit module coupled to the plurality of implementations. The construction kit module is operable to communicate with a phone module and to create and maintain a construction kit window displaying a plurality of telephone feature controls. The construction kit module also is operable to control customization of the phone window responsive to user input in the construction kit window when the construction kit module is in a design state.

According to a further embodiment of the present invention, a method of customizing a computer on-screen telephone is provided that includes a number of steps. The method includes placing a computer on-screen telephone having a telephone state and a design state in the design state. Then a phone window of the computer on-screen telephone is modified by adding, removing and repositioning a plurality of telephone feature controls. The computer on-screen telephone is then placed in the telephone state such that the plurality of telephone feature controls appear and are operational according to changes made in the step of modifying.

A technical advantage of the present invention is the provision of a telephone construction kit allowing a user of the computer on-screen telephone to customize the appearance, layout and features of the computer on-screen telephone.

Another technical advantage of the present invention is the allowance of interactive customization of a computer on-screen telephone utilizing drag and drop of phone feature controls. No recompilation is required after a modification to the computer on-screen telephone. A user also is allowed to customize an appearance of an icon by dropping a user-defined bitmap on the icon.

A further technical advantage of the present invention is the provision of a separate construction kit including implementations that define appearances of controls that are associated with a specific subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention may be acquired by referring to the following description taken in conjunction with the accompanying drawings in which like reference numbers indicate like features and wherein:

FIGURE 1 illustrates a block diagram of one embodiment of a computer on-screen telephone having a telephone construction kit constructed according to the teachings and the present invention;

FIGURE 2 illustrates a computer system including a computer on-screen telephone constructed according to the teachings of the present invention;

FIGURE 3 illustrates a state diagram of the operation of a computer on-screen telephone constructed according to the teachings of the present invention; and

FIGURE 4 illustrates a flow chart of the drag and drop operation of a computer on-screen telephone constructed according to the teachings of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 illustrates a block diagram of a computer on-screen telephone, indicated generally at 2, constructed according to the teachings of the present invention. Computer on-screen telephone 2 includes a phone module 4 and a construction kit module 6. Phone module 4 is coupled to construction kit module 6, to an input/output (I/O) device 7 and to a dynamic linked library 8. Construction kit module 6 is also coupled to dynamic linked library 8. In the illustrated embodiment, computer on-screen telephone 2 operates in a Windows environment.

Dynamic linked library 8 includes an implementation 9 for each phone feature that is implemented by computer on-screen telephone 2. Phone feature controls are associated with each implementation 9 and represent the telephone features implemented by computer on-screen telephone 2 as discussed in more detail below. Each implementation 9 includes a functional implementation 10 and a visual implementation 11 defining the implementation of each phone feature control. In one embodiment of the present invention, functional implementation 10 comprises working object code and visual implementation 11 comprises a resource in a Windows environment. Each implementation 9 is illustrated as including both functional implementation 10 and visual implementation 11. Other embodiments of the present invention are possible where functional implementation 10 and visual implementation 11 are in different dynamic linked libraries.

Computer on-screen telephone 2 further includes a phone window 12 and a construction kit window 14. Phone window 12 is coupled to phone module 4, and construction kit window 14 is coupled to construction kit module 6. Phone window 12 includes a workspace 16 holding a

plurality of telephone feature controls associated with implemented telephone features. Each telephone feature control is associated with a unique implementation 9 in dynamic linked library 8.

There are eleven telephone feature controls illustrated in workspace 16. This number is not fixed and can be customized by a user as discussed below. The illustrated phone feature controls are chosen for purposes of description. Workspace 16 includes six speed dial controls 20, 22, 24, 26, 28 and 30. Workspace 16 further includes an address book control 32, a dial number control 34, a speaker phone control 36, an answering machine control 38 and a log call control 40. Phone window 12 also includes a button bar, indicated generally at 41, including a design button 42, a setup button 44, an options button 46 and a help button 48.

Construction kit window 14 includes a workspace 50. Workspace 50 holds a plurality of telephone feature controls. The telephone feature controls displayed in workspace 50 depend upon which of a number of telephone feature groups is selected. The number of selectors and groups can be organized as appropriate. As illustrated, workspace 50 includes five selectors for selecting a telephone feature group. Workspace 50 includes a buttons group selector 52, a keypads group selector 54, an applications group selector 56, a lists group selector 58 and a status group selector 60. In the illustrated embodiment, buttons group selector 52 is selected and the buttons group includes five phone feature controls. The buttons group includes a speed dial control 62, a flash control 64, a speaker phone control 66, a dial number control 68 and a mute control 70. Construction kit window 14 also includes a button bar indicated generally at 71 having a number of buttons. Button bar 71 includes a save button 72, a help button 74 and an exit button 76.

Construction kit window 14 further includes a phones drop down list 78 and a looks drop down list 80.

In operation, computer on-screen telephone 2 operates to allow a user to interface with a telephone line utilizing the phone features represented by the phone feature controls located in phone window 12. According to the teachings of the present invention, computer on-screen telephone 2 also allows a user to customize phone window 12 as desired by invoking construction kit window 14. The user can customize the layout and telephone features by dragging and dropping telephone feature controls. Computer on-screen telephone 2 further allows customization of the background of phone window 12 and of the icons representing the phone feature controls.

Computer on-screen telephone 2 operates in two states: a design state and a telephone state. When construction kit window 14 is closed and inactive, computer on-screen telephone 2 operates in the telephone state allowing the user to utilize the phone features in phone window 12. When construction kit window 14 is open and active, computer on-screen telephone 2 operates in the design state allowing the user to customize the appearance and features of phone window 12.

An implementation 9 exists for each telephone feature control in phone window 12 and construction kit window 14. The appearance of each telephone feature control is defined by visual implementation 11. Each functional implementation 10 defines the operation of each telephone feature control. Visual implementation 11 can be altered without affecting functional implementation 10 for each telephone feature control because functional implementation 10 is independent of visual implementation 11. A change in the appearance of

a telephone feature control is accomplished by replacing visual implementation 11.

When computer on-screen telephone 2 is in the telephone state, the telephone feature controls in phone window 12 are operational and respond to user input. Phone window 12 is created and maintained by phone module 4. A user invokes a telephone feature by selecting a telephone feature control in phone window 12. In one embodiment of the present invention, a user invokes a phone feature by pressing a mouse button while a cursor on a screen is positioned over the desired phone feature control. After a telephone feature control is selected, phone window 12 sends a signal to phone module 4 indicating which phone feature control is selected. Phone module 4 receives the signal from phone window 12 and invokes the appropriate functional implementation 10 to perform the selected telephone feature. Phone module 4 controls the execution of functional implementation 10 and communicates with I/O device 7 and phone window 12 as appropriate for the selected telephone feature. I/O device 7 operates to interface with a telephone line or other communications devices. Each visual implementation 11 in each implementation 9 operates to define the icon representing each telephone feature control. Phone module 4 accesses each visual implementation 11 and displays each telephone feature control in phone window 12.

A user can place computer on-screen telephone 2 in the design state by selecting design button 42. Design button 42 operates as a design enable button. When design button 42 is selected, phone window 12 sends a signal to phone module 4. Phone module 4 then sends a design enable signal to construction kit module 6 to activate construction kit window 14 and place computer on-screen telephone 2 in the design state.

When computer on-screen telephone system 2 is in the design state, construction kit window 14 is active and phone window 12 is inactive. All of the phone feature controls in phone window 12 and construction kit window 14 are inoperative. Each phone feature control can be dragged and dropped between construction kit window 14 and phone window 12 as desired by a user of computer on-screen telephone 2. Further, a user may restore specific user-defined layouts using phones drop down list 78 or switch to a different set of telephone feature controls associated with a specific subject matter using looks drop down list 80. Construction kit module 6 receives signals from construction kit window 14 defining modifications to phone window 12 and movement of telephone feature controls between phone window 12 and construction kit window 14. Construction kit module 6 operates to allow the telephone feature controls within phone window 12 to be repositioned or removed and to allow new telephone feature controls to be added.

In the illustrated embodiment of the present invention, there are three types of telephone feature controls. The first type of telephone feature control may appear only once in construction kit window 14 and once in phone window 12. An example of such a telephone feature control is a dial number control. Only one dial number control is allowed. The second type of telephone feature control implements similar features but have different appearances. This type of telephone feature control only appears once in phone window 12. An example of such a telephone feature control is a dialing keypad control, although one is not illustrated in FIGURE 1. A number of dialing keypad controls are included in the keypads group selected by keypads group selector 54 in construction kit window 14, but only one can appear in phone window 12. The third type of telephone feature

control appears once in construction kit window 14 but may appear several times in phone window 12. An example of this third type of telephone feature control is a speed dial control. Other types of telephone feature controls are possible. It should be understood that how often a telephone feature control may appear in either window is dependent upon the desired implementation and customization of the telephone system by the user.

When a user drags and drops a telephone feature control, construction kit module 6 receives a signal from construction kit window 14. For a new telephone feature control in phone window 12, construction kit module 6 activates a new implementation 9 in dynamic linked library 8. Construction kit module 6 deactivates the implementation 9 associated with any phone feature controls removed from phone window 12, and modifies visual implementation 11 for any repositioned phone feature control. A user may customize the features, layout and appearance of phone window 12 as desired when computer on-screen telephone 2 is in the design state.

Exit button 76 operates as a design disable button. A user may return to the telephone state by selecting exit button 76 causing construction kit module 6 to close construction kit window 14 and to send a design disable signal to phone module 4.

The phone feature controls illustrated in phone window 12 each operate to perform a different telephone feature when computer on-screen telephone 2 is in the telephone state. For example, the speed dial controls are operable to display a name associated with the button and allow a telephone number to be dialed. This information can be defined by the user. Speed dial controls 20, 22, 24, 26, 28 and 30 each operate to dial a number assigned by the user. Address book control 32 allows a user to maintain a listing of names, addresses

and telephone numbers and other such information. Dial number control 34 operates to allow a user to dial the number entered into the entry space. Speaker phone control 36 allows the user to utilize computer on-screen telephone 2 as a speaker phone. Answering machine control 38 operates to perform features similar to features available on conventional answering machines such as recording a greeting, leaving an outgoing message and recording incoming messages. Log call control 40 allows a user to maintain and review a log holding information about each call made and received. Other such phone features can be implemented. The phone feature controls illustrated are only for purposes of description and are not intended to limit the teachings of the present invention. Any feature implemented in a conventional telephone, speaker phone, feature phone, display phone or similar such device can be implemented as a telephone feature in computer on-screen telephone 2.

The phone feature controls in construction kit workspace 50 are available to a user to drag into phone window 12 when construction kit window 14 is open as discussed above. Thus, as illustrated, the user could add flash control 64 to workspace 16 of phone window 12. Phone window 12 then would implement a flash function using the new telephone feature control after construction kit window 14 was closed. In this manner, a user may interactively customize the features, layout and appearance of phone window 12.

The customization options available to a user are defined by the features displayed in construction kit window 14. A construction kit comprising a construction kit module and the appropriate implementations can be provided to a user as a separate unit. The user can use the construction kit containing desired features and appearances to customize the computer on-screen telephone

including new features, a new background or new icons associated with a specific subject matter. A user may acquire many construction kits each providing different options. A user can customize phone window 12 by invoking a saved layout defining a configuration of phone window 12. The user can interactively customize the features and layout by moving controls. The user also can switch to different feature sets and looks. The user can further customize phone window 12 by changing the appearance of each control by changing the visual implementation or dropping a user defined bitmap onto the control.

A technical advantage of the present invention is the ability to customize the features and layout of phone window 12 and the appearance of the phone feature controls and the background of phone window 12. Customizing of features is accomplished by dragging and dropping of telephone feature controls. Customizing the appearance is accomplished interactively. No recompilation of source code is required. Once the construction kit window 14 is closed all controls are operative. Separate construction kit modules can be provided that allow a user to change the appearance of phone window 12 as desired.

FIGURE 2 illustrates a computer system, indicated generally at 100, including a computer on-screen telephone constructed according to the teachings of the present invention. Computer 102 is coupled to a keyboard 104, a mouse 105 and a display 106. Computer 102 includes an interface card 108 plugged into a card slot in computer 102. Interface card 108 is coupled to telephone 110 and telephone line 112. According to the teaching of the present invention, phone window 12 and construction kit window 14 of the computer on-screen telephone appear on display 106.

Computer system 100 operates to execute a computer on-screen telephone constructed according to the teachings of the present invention. A user of computer system 100 interfaces with phone window 12 and construction kit window 14 using keyboard 104 and mouse 105. Interface card 108 operates to communicate with telephone 110 and telephone line 112. Interface card 108 can comprise an attachment to a DSP-based sound board, a voice fax modem and a multimedia DSP card. Interface card 108 can be replaced with an external interface device in other embodiments of the present invention. A user of computer system 100 can utilize the computer on-screen telephone to customize the computer on-screen telephone and to perform desired telephone features as discussed above.

FIGURE 3 illustrates a state diagram of the operation of a computer on-screen telephone constructed according to the teachings of the present invention. A design state 120 of the computer on-screen telephone corresponds to the construction kit window being open. A telephone state 122 of the computer on-screen telephone corresponds to the construction kit window being closed. When the computer on-screen telephone is in design state 120, a selection 124 of a design disable button, or exit button, causes the computer on-screen telephone to move to telephone state 122. When in telephone state 122, a selection 126 of a design enable button, or design button, causes computer on-screen telephone to move to design state 120.

In design state 120, a number of activities 128, 130, and 132 maintain the computer on-screen telephone in design state 120 after they are performed. Activity 128 constitutes a telephone feature control being dragged from the construction kit window to the phone window. Activity 130 constitutes a telephone feature control

being removed from the phone window by dragging it to the construction kit window. Finally, activity 132 constitutes a telephone feature control being repositioned within the phone window. A user of the computer on-screen telephone may perform these three activities to customize the computer on-screen telephone while in design state 120.

In telephone state 122, the construction kit window is closed. Activity 134 maintains the computer on-screen telephone in telephone state 122 after it is performed. Activity 134 constitutes a telephone feature control being selected by a user such that the telephone feature control is invoked and is executed by the computer on-screen telephone. The computer on-screen telephone operates according to the state diagram of FIGURE 3 to allow the user of the computer on-screen telephone to interact with a telephone line as desired according to the phone feature controls located in the phone window when the computer on-screen telephone is in telephone state 122. The user is allowed interactively to customize the computer on-screen telephone as desired when the computer on-screen telephone is in design state 120.

FIGURE 4 illustrates a flow chart of the drag and drop operation of a computer on-screen telephone constructed according to the teachings of the present invention. In this embodiment, a user provides input from a mouse to select, drag and drop phone feature controls while the computer on-screen telephone is in the design state.

In step 140, the computer on-screen telephone checks whether a mouse button down signal has been generated in either the phone window or the construction kit window. If a mouse button down signal has not been generated, step 140 is repeated and the computer on-screen telephone

waits for such a signal. If a mouse button down signal is received in one of the two windows, the computer on-screen telephone checks whether the mouse button down was generated in the construction kit window. If it was, the mouse pointer coordinates are stored in step 144. Also in step 144, the mouse cursor is changed to a drag cursor, and a ghost outline of the selected phone feature control is displayed in the construction kit window. If the mouse button down was generated in the phone window, the mouse pointer coordinates are stored in step 146. Also in step 146, the phone feature control image is hidden, the mouse cursor is changed to a drag cursor, and a ghost outline of the selected phone feature control is displayed in the phone window.

After step 144 and step 146, the computer on-screen telephone checks whether the drag cursor is in the construction kit window in step 148. If the drag cursor is in the construction kit window, a ghost outline of the selected phone feature control is displayed in the construction kit window in step 154. If the drag cursor is not in the construction kit window, the computer on-screen telephone checks whether the drag cursor is in the phone window in step 152. If so, then a ghost outline is displayed in the phone window in step 154. If in step 152 the drag cursor is not in the phone window, a "can't drop" icon is displayed in step 156. Step 158 follows steps 154 and 156.

In step 158, the computer on-screen telephone checks whether a mouse button up signal has been received. If it has not been received, the flow returns to step 148 such that the proper image is displayed while the telephone feature control is dragged. If a mouse button up signal has been received, the phone feature control has been dropped, and the flow continues to step 160.

In step 160, the computer on-screen telephone checks whether the drag cursor was in the construction kit window. If so, then the mouse cursor is changed to normal in step 162, and the process is done. In this case, no modification was made to the phone window. If the drag cursor is not in the construction window, the computer on-screen telephone checks in step 164 whether the drag cursor is outside the phone window. If so, the flow continues to step 162 where the mouse cursor is changed to normal, and the process is done. In this case, either no modification occurred or a phone feature control was removed from the phone window. If the drag cursor is not outside the phone window, then step 166 is performed. In step 166, a visual instance of the selected phone feature control is created in the phone window. The visual instance is positioned within the phone window according to the location of the drag cursor. The ghost outline of the selected phone feature control is then hidden. In this case, a modification has occurred. Either a phone feature control was repositioned in or a phone feature control was added to the phone window. After step 166, the mouse cursor is changed to normal in step 162, and the process is done.

A technical advantage of the present invention is the provision of a telephone construction kit allowing a user of the computer on-screen telephone to customize the appearance and features of the telephone.

Another technical advantage of the present invention is the allowance of interactive customization of a computer on-screen telephone utilizing drag and drop of phone feature controls. No recompilation is required after a modification to the computer on-screen telephone. A user also is allowed to customize an appearance of an icon by dropping a user-defined bit map on the icon.

A further technical advantages of the present invention is the provision of a separate construction kit including implementations that define appearances of controls that are associated with a specific subject matter.

Although the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A computer on-screen telephone, comprising:

a plurality of implementations each defining a telephone feature control;

a phone module coupled to the plurality of implementations, the phone module operable to create and maintain a phone window displaying a first plurality of telephone feature controls, wherein the phone module is further operable to invoke an implementation defining a selected telephone feature control responsive to user input in the phone window when the computer on-screen telephone is in a telephone state; and

a construction kit module coupled to the phone module and to the plurality of implementations, the construction kit module operable to create and maintain a construction kit window displaying a second plurality of telephone feature controls, wherein the construction kit module is further operable to control customization of the phone window responsive to user input when the computer on-screen telephone is in a design state.

2. The computer on-screen telephone of Claim 1, wherein the computer on-screen telephone operates in a Windows environment.

3. The computer on-screen telephone of Claim 2, further comprising a dynamic linked library operable to hold the plurality of implementations, and wherein each implementation in the plurality of implementations comprises a functional implementation defining a function and a visual implementation defining an appearance of a telephone feature control.

4. The computer on-screen telephone of Claim 1, wherein the phone module is further operable to display a design enable button in the phone window, to generate a design enable signal responsive to selection of the design enable button when the computer on-screen telephone is in the telephone state, and to provide the design enable signal to the construction kit module such that the computer on-screen telephone changes to the design state.

5. The computer on-screen telephone of Claim 4, wherein the construction kit module is operable to open the construction kit window responsive to the design enable signal.

6. The computer on-screen telephone of Claim 1, wherein the construction kit module is further operable to display a design disable button in the construction kit window, to generate a design disable signal responsive to selection of the design disable button when the computer on-screen telephone is in the design state, and to provide the design disable signal to the phone module such that the computer on-screen telephone changes to the telephone state.

7. The computer on-screen telephone of Claim 6, wherein the construction kit module is operable to close the construction kit window responsive to selection of the design disable button.

8. The computer on-screen telephone of Claim 1, wherein the customization controlled by the construction kit module comprises adding, removing and repositioning telephone feature controls in the phone window responsive

to dragging and dropping of telephone feature controls between the construction kit window and the phone window.

9. The computer on-screen telephone of Claim 1, wherein the customization controlled by the construction kit module comprises replacing an appearance of a telephone feature control responsive to dragging and dropping of a user defined bitmap.

10. The computer on-screen telephone of Claim 1, further comprising an input/output device coupled to the phone module, the input/output device operable to interface with a telephone line responsive to the phone module.

11. A construction kit for a computer on-screen telephone, comprising:

a plurality of implementations each defining a telephone feature control; and

a construction kit module coupled to the plurality of implementations, the construction kit module operable to communicate with a phone module and to create and maintain a construction kit window displaying a plurality of telephone feature controls, wherein the construction kit module is further operable to control customization of the phone window responsive to user input when the construction kit module is in a design state.

12. The construction kit of Claim 11, wherein each implementation in the plurality of implementations comprises a functional implementation defining a function and a visual implementation defining an appearance of a telephone feature control.

13. The construction kit of Claim 11, wherein the plurality of implementations comprise a replaceable dynamic linked library for use in a Windows environment.

14. The construction kit of Claim 11, wherein the construction kit module is operable to open the construction kit window responsive to a design enable signal received from the phone window.

15. The construction kit of Claim 11, wherein the construction kit module is further operable to display a design disable button in the construction kit window, to generate a design disable signal responsive to selection of the design disable button when the computer on-screen telephone is in the design state, and to provide the design disable signal to the phone module.

16. The construction kit of Claim 15, wherein the construction kit module is operable to close the construction kit window responsive to selection of the design disable button.

17. The construction kit of Claim 11, wherein the customization controlled by the construction kit module comprises adding, removing and repositioning telephone feature controls in the phone window responsive to dragging and dropping of telephone feature controls between the construction kit window and the phone window.

18. The construction kit of Claim 17, wherein the construction kit provides a plurality of implementations such that the appearance defined by each implementation is associated with a specific subject matter.

19. The construction kit of Claim 11, wherein the customization controlled by the construction kit module comprises providing a background for the phone window operable to replace a prior background of the phone window.

20. The construction kit of Claim 11, wherein the customization controlled by the construction kit module comprises replacing an appearance of a telephone feature control responsive to dragging and dropping of a user defined bitmap.

21. A method of customizing a computer on-screen telephone, comprising the steps of:

placing a computer on-screen telephone having a telephone state and a design state in the design state;

modifying a phone window of the computer on-screen telephone by adding, removing and repositioning a plurality of telephone feature controls changing a layout and features of the phone window; and

placing the computer on-screen telephone in the telephone state such that the plurality of telephone feature controls appear and are operational according to changes made in the step of modifying.

22. The method of Claim 21, wherein the step of placing the computer on-screen telephone in the design state comprises opening a construction kit window responsive to selection of a design button in the phone window.

23. The method of Claim 21, wherein the step of modifying comprises dragging and dropping telephone feature controls between a construction kit window and the phone window.

24. The method of Claim 23, wherein the telephone feature controls are selected from a plurality of telephone feature controls implemented by a replaceable dynamic link library.

25. The method of Claim 21, wherein the step of modifying comprises dragging and dropping a bitmap on an icon representing a telephone feature control to change an appearance of the icon.

26. The method of Claim 21, wherein the step of placing the computer on-screen telephone in the telephone state comprises closing the construction kit window responsive to selection of an exit button in the construction kit window.

27. The method of Claim 21, wherein the step of modifying further comprises changing an appearance of the phone window.

28. The method of Claim 27, wherein the step of modifying comprises changing an appearance of the plurality of telephone feature controls and the background of the phone window.

29. A personal computer executing a computer on-screen telephone, comprising:

a personal computer having a display, the personal computer operable to store data representing a plurality of implementations each defining a telephone feature control and executing a computer on-screen telephone, wherein the computer on-screen telephone comprises;

a phone module operable to create and maintain a phone window displaying a first plurality of telephone feature controls, the phone module further operable to invoke an implementation defining a selected telephone feature control responsive to user input in the phone window when the computer on-screen telephone is in a telephone state; and

a construction kit module operable to create and maintain a construction kit window displaying a second plurality of telephone feature controls, the construction kit module further operable to control customization of the phone window responsive to user input when the computer on-screen telephone is in a design state; and

an interface device coupled to the personal computer, the interface device operable to provide an interface between the personal computer and a telephone line.

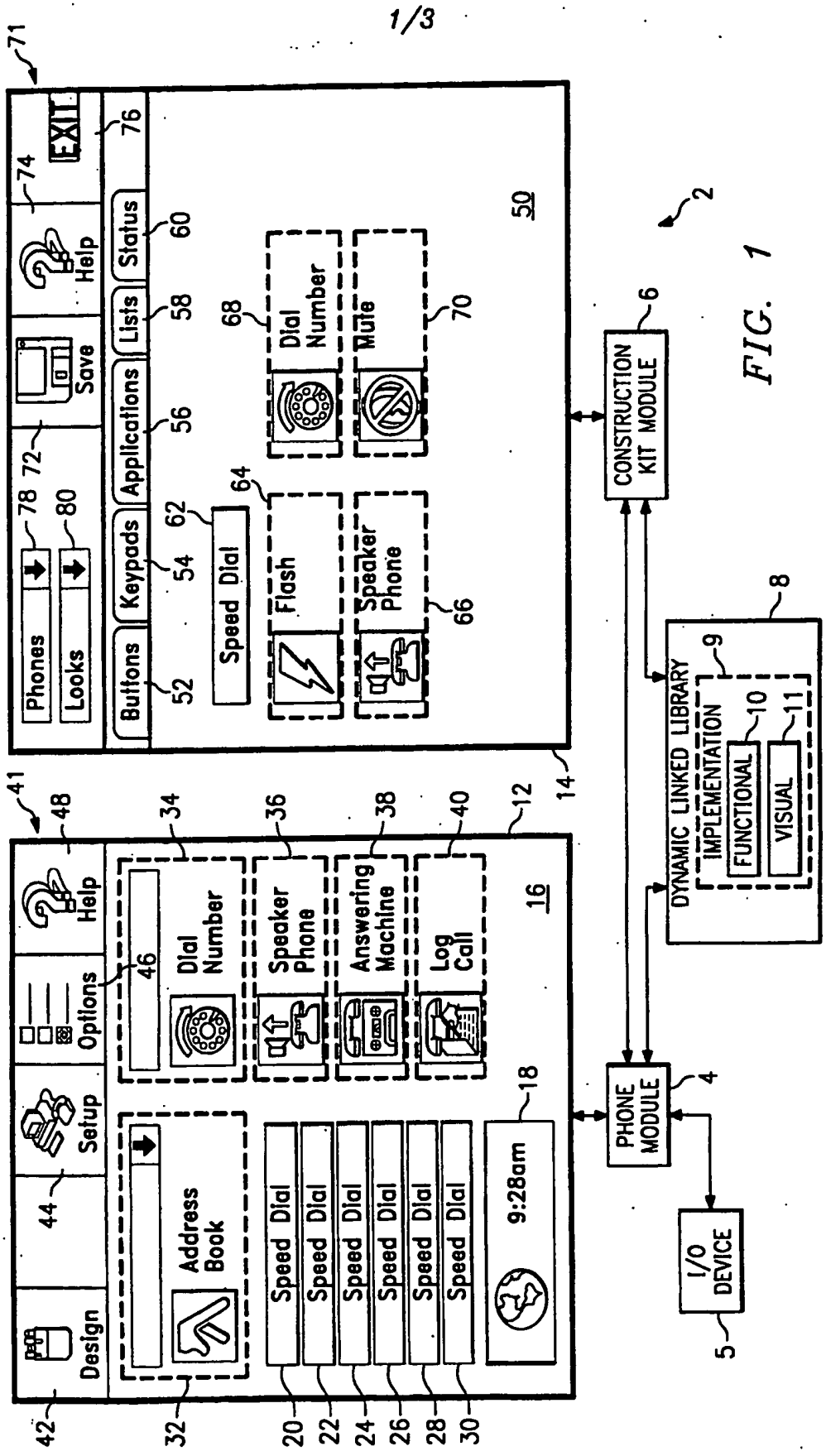
71
EXIT
74
Help
Save
72
Status
60
Lists
58
Applications
56
Keypads
54
Buttons
52
Phones
78
Looks
80
62
64
Speed Dial
Flash
Speaker Phone
66
68
Dial Number
Mute
70
50
2
CONSTRUCTION KIT MODULE
6
DYNAMIC LINKED LIBRARY
8
IMPLEMENTATION
9
FUNCTIONAL
10
VISUAL
11
PHONE MODULE
4
I/O DEVICE
5
41
48
Help
Options
46
34
Dial Number
36
Speaker Phone
38
Answering Machine
40
Log Call
12
14
16
Design
42
44
Setup
Address Book
32
Speed Dial
20
Speed Dial
22
Speed Dial
24
Speed Dial
26
Speed Dial
28
Speed Dial
30
9:28am
18

FIG. 1

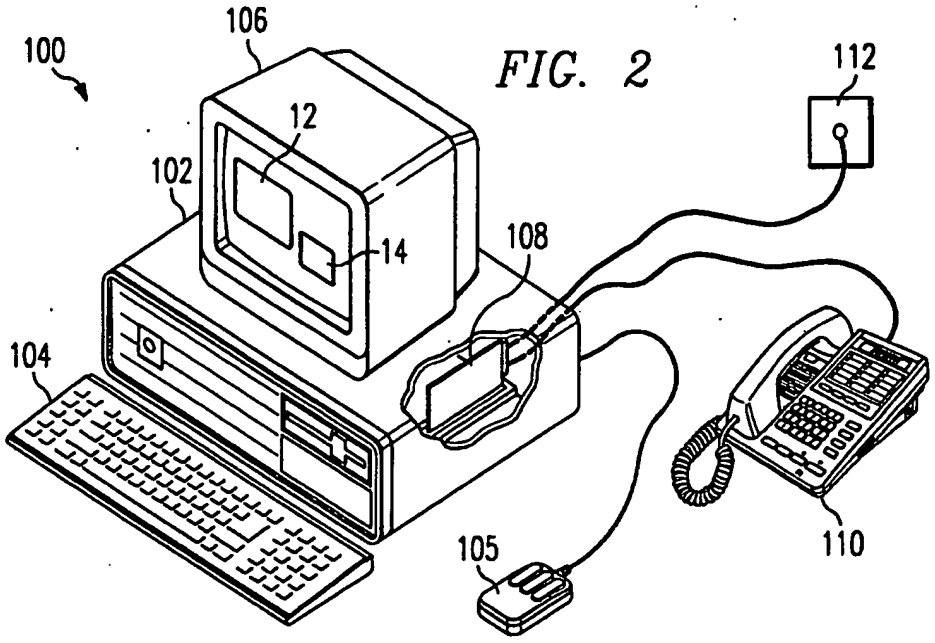
100
106
12
102
14
108
112
104
105
110

FIG. 2

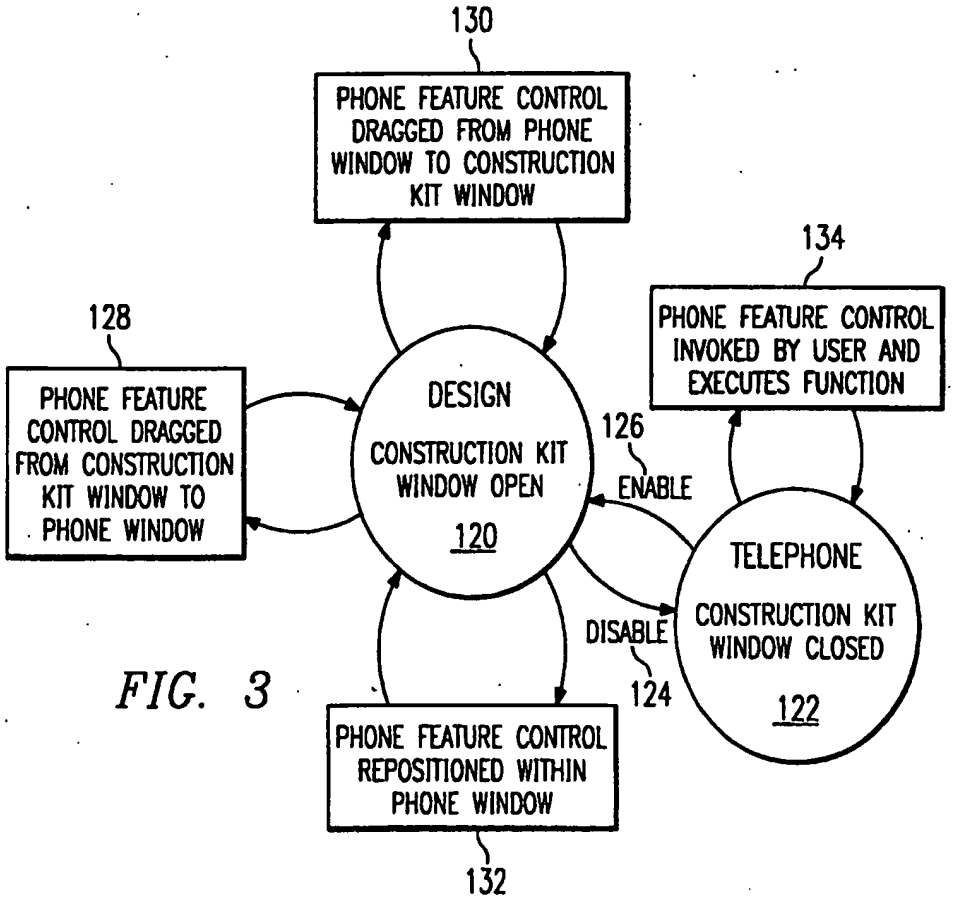
130
PHONE FEATURE CONTROL DRAGGED FROM PHONE WINDOW TO CONSTRUCTION KIT WINDOW
134
PHONE FEATURE CONTROL INVOKED BY USER AND EXECUTES FUNCTION
128
PHONE FEATURE CONTROL DRAGGED FROM CONSTRUCTION KIT WINDOW TO PHONE WINDOW
DESIGN
CONSTRUCTION KIT WINDOW OPEN
120
126
ENABLE
TELEPHONE
CONSTRUCTION KIT WINDOW CLOSED
122
DISABLE
124
PHONE FEATURE CONTROL REPOSITIONED WITHIN PHONE WINDOW
132

FIG. 3

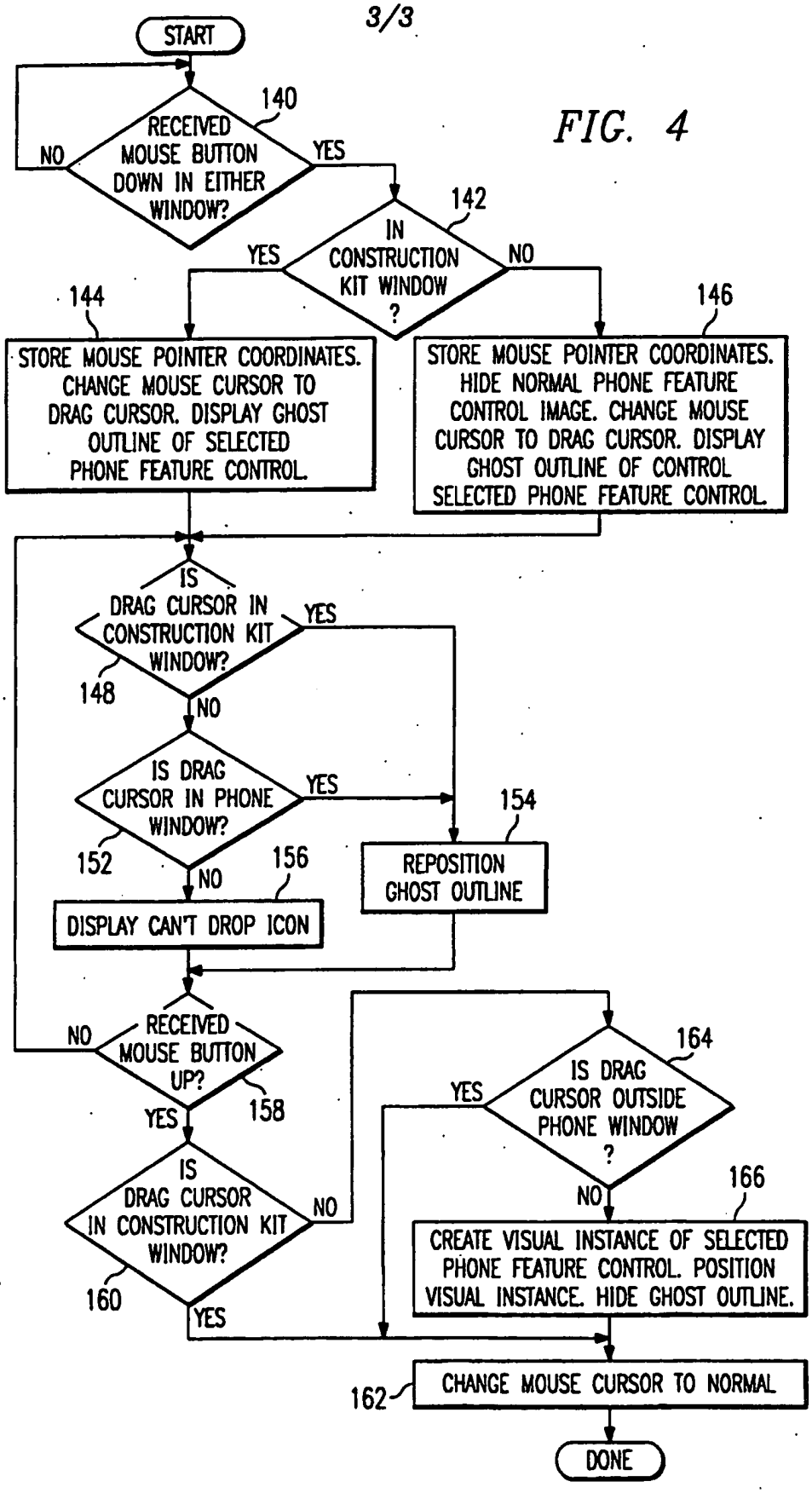
START
RECEIVED MOUSE BUTTON DOWN IN EITHER WINDOW?
140
NO
YES
IN CONSTRUCTION KIT WINDOW ?
142
YES
NO
144
STORE MOUSE POINTER COORDINATES. CHANGE MOUSE CURSOR TO DRAG CURSOR. DISPLAY GHOST OUTLINE OF SELECTED PHONE FEATURE CONTROL.
146
STORE MOUSE POINTER COORDINATES. HIDE NORMAL PHONE FEATURE CONTROL IMAGE. CHANGE MOUSE CURSOR TO DRAG CURSOR. DISPLAY GHOST OUTLINE OF CONTROL SELECTED PHONE FEATURE CONTROL.
IS DRAG CURSOR IN CONSTRUCTION KIT WINDOW?
YES
148
NO
IS DRAG CURSOR IN PHONE WINDOW?
YES
154
152
NO
156
REPOSITION GHOST OUTLINE
DISPLAY CAN'T DROP ICON
RECEIVED MOUSE BUTTON UP?
NO
YES
158
IS DRAG CURSOR IN CONSTRUCTION KIT WINDOW?
NO
160
YES
IS DRAG CURSOR OUTSIDE PHONE WINDOW ?
164
YES
NO
166
CREATE VISUAL INSTANCE OF SELECTED PHONE FEATURE CONTROL. POSITION VISUAL INSTANCE. HIDE GHOST OUTLINE.
CHANGE MOUSE CURSOR TO NORMAL
162
DONE

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/08345

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G09G 5/00; H04H 1/00
US CL : 345/112,118; 379/354,356,357; 395/156

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/112, 118, 119; 379/354 - 357; 395/156,159

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	AT&T "SMART PHONE", published by AT&T Network Systems, 1991, 5 pages.	21,22 --- 1-20,23-29
Y	EP, A, 0,523,661 (OKADA) 20 JANUARY 1993, FIG.5, COL.8, LINES 50 - COL.11, LINE1.	1-20,23-29

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be part of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 AUGUST 1995	01 SEP 1995

Name and mailing address of the ISA/US	Authorized officer
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